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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/813,330

03/30/2004

Jong-mycong Lee

5649-1205

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20792 7590 11/27/2007  
MYERS BIGEL SIBLEY & SAJOVEC  
PO BOX 37428  
RALEIGH, NC 27627

EXAMINER

EVERHART, CARIDAD

ART UNIT

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2891

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/813,330	<b>Applicant(s)</b> LEE ET AL.	
	<b>Examiner</b> Caridad M. Everhart	<b>Art Unit</b> 2891	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 10 October 2007.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 14-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 19 is/are allowed.
- 6) ☒ Claim(s) 1,3-12,14-18,20 is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

### Response to Arguments

Applicant's arguments with respect to claims 1-12 and 14-20 have been considered but are moot in view of the new ground(s) of rejection.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1,3-5,14, 16,17, 18,and 20 are rejected under 35 U.S.C. 102(b) as being anticipated by Yu et al (US 6,287,968).

Yu et al discloses a method for forming aluminum or copper filled (col. 1, lines 15-22 and 55-62) dual damascene structures. Fig. 4C shows that the dual damascene structures are formed and have a barrier layer; a fill of flowable material is formed and the barrier is removed from the upper surface of the insulation layer(Fig. 4D) and the structures are filled with metal which may be aluminum(Fig. 4F). The process is disclosed in col. 6, lines 38-42; col. 7, lines 1-4 and 6-13; col. 1, lines 55-62. The flowable material may be photoresist or non-photosensitive resist material(col. 7, lines 1-4). The metal is planarized by polishing which includes CMP(col. 3, lines 7-12). It is seen in Fig. 4C that the mold layer is a multilayer mold layer .

***Claim Rejections - 35 USC § 103***

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 7-12 , 14, and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yu et al as applied to claim 1 above, and further in view of Hussein et al (US 2001/0055725A1).

Yu et al is silent with respect to SOG, and with respect to the etch selectivity, the etch methods, and the deposition methods of the aluminum.

Hussein et al discloses that SOG may be used as the flowable protective layer in the formation of a dual damascene structure(claim 1). Hussein further discloses that the via is formed and then the trench is formed over the via(Fig. 1e and Fig. 1f). The method results in desirable characteristics of the via and trench walls(paragraph 0040).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have used the method taught by Hussein in the method taught by Yu et al because Yu et al teach that the flowable material may be non photosensitive and SOG has etch selectivity with respect to the mold layer, as does photoresist taught by Yu et al.

It would have been obvious to one of ordinary skill in the art at the time of the invention to have used reflow of the aluminum because it is conventionally used in the art to improve the fill characteristics of aluminum fill. It would have been obvious to one of ordinary skill in the art at the time of the invention to have used the recited etch

methods because these are known for the recited materials and would have been within the ordinary skill in the art.

***Allowable Subject Matter***

Claim 19 is allowed.

Claim 2 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record not relied upon is considered relevant to applicant's disclosure.

Moon et al (US 2001/0021581A1).

Moon et al disclose forming a via, forming a sacrificial plug in the via and then forming the trench over the via and removing the sacrificial material from the plug(Fig. 4, Fig. 5, and Fig. 6).

Ranagajan et al (US 2001/0027003A1).

Ranagarajan et al disclose forming a via, forming a sacrificial plug in the via and then forming a trench over the plug and removing the sacrificial material(Fig. 5 and Fig. 6).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*C. Everhart*  
CAROL A. EVERHART  
PATENT EXAMINER

C. Everhart  
11-26-2007